PB90-177858

Superfund Record of Decision (EPA Region 7): Vogel Paint and Wax Maurice, IA. (First Remedial Action), September 1989

(U.S.) Environmental Protection Agency, Washington, DC

20 Sep 89

U.S. Department of Commerce
National Technical Information Service
NTIS

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Agency

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Emergency and
Remedial Response

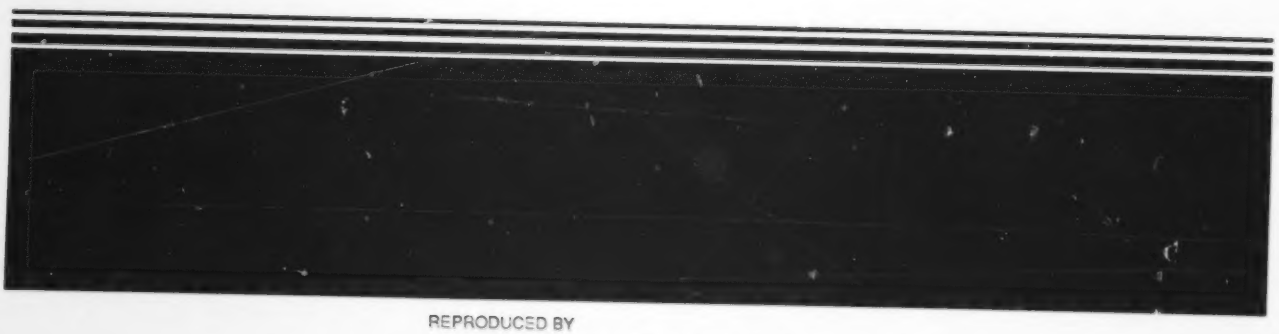
EPA/ROD/R07-89/027
September 1989

PB90-177858

EPA

Superfund Record of Decision:

Vogel Paint & Wax, IA



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50272-10

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R07-89/027	2.	3. Recipient's Accession No. PB 90 177858/AS
4. Title and Subtitle SUPERFUND RECORD OF DECISION Vogel Paint & Wax, IA First Remedial Action - Final			5. Report Date 09/20/89
7. Author(s)			6. 8. Performing Organization Rept. No.
9. Performing Organization Name and Address			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000 14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Vogel Paint & Wax (VPW) site is an approximately two-acre disposal area two miles southwest of the town of Maurice, in Sioux County, Iowa. Adjacent land uses are primarily agricultural; however, several private residences are within one-quarter mile of the site. An intermittent stream flows through the site and discharges to the West Branch Floyd River one mile away. A surficial sand and gravel aquifer underlies the site and supplies nearby private wells and the Southern Sioux County Rural Water System, located a mile and one half southeast of the site. Paint sludge, resins, solvents, and other paint manufacturing wastes were disposed of at the site between 1971 and 1979. The disposal area is on two acres of an 80-acre tract owned by VPW. Liquid wastes were poured into trenches along with filled or partially filled drums and other debris and capped with one to two feet of soil. VPW records indicate that approximately 43,000 gallons of aliphatic and aromatic hydrocarbons and 6,000 pounds of metals waste were buried at the site. The disposal area was covered with clay in 1984. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, toluene, and xylenes; and metals including chromium and lead.

The selected remedial action for this site includes excavation of contaminated soil and separation of solid and liquid wastes; onsite bioremediation of 3,000 cubic yards of the contaminated soil in a fully contained surface impoundment. (Continued on next page)

17. Document Analysis a. Descriptors

Record of Decision - Vogel Paint & Wax, IA
First Remedial Action - Final
Contaminated Media: soil, gw
Key Contaminants: VOCs (benzene, toluene, xylene), metals (chromium, lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 47
	20. Security Class (This Page) None	22. Price A03

(See ANSI-Z39.18) See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

16. Abstract (Continued)

unit, or onsite thermal treatment if soil contains high metal content; stabilization of treated soil, if necessary to prevent leaching of metals, followed by disposal in the excavated area; offsite incineration, recycling or disposal of solid and liquid wastes; recycling of leachate and offsite treatment at POTW of excess leachate; ground water pumping and treatment using air stripping with discharge of treated water to a nearby stream; and ground water and air monitoring. VOC emissions to the atmosphere from both the soil and ground water cleanup actions will be controlled by carbon adsorption, if necessary. The estimated present worth cost for this remedial action is $1,851,000 which includes an annual O&M cost of $54,600.

RECORD OF DECISION

FOR

THE VOGEL PAINT AND WAX COMPANY SITE

MAURICE, IOWA

Prepared by:

IOWA DEPARTMENT OF NATURAL RESOURCES

September 14, 1989

DECLARATION FOR THE RECORD OF DECISION

1.0 Site Name and Location

Vogel Paint and Wax company; Maurice, Iowa

1.1 Statement of Basis and Purpose

This decision document presents the selected remedial action for the Vogel Paint and Wax Company site, in Sioux County, Iowa, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the remedy for this site.

The Iowa Department of Natural Resources concurs with the selected remedy. The information supporting this remedial action decision is contained in the administrative record for this site.

1.2 Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial threat to public health, welfare, or the environment.

1.3 Description of the Selected Remedy

The selected remedy consists of activities involving soil and groundwater cleanup. Contaminated soils will be excavated and solid and liquid waste will be separated for off-site incineration, recycling, or disposal. An estimated 3000 cubic yards of contaminated soils will be treated using a bioremediation process in a fully contained surface impoundment unit. If additional testing shows bioremediation to be infeasible due to high metal levels, on-site thermal treatment will be implemented in its place. Treated soil will be stabilized if necessary to prevent leaching of metals, placed back into the excavation and covered. Groundwater will be pumped and air stripped with discharge to the nearby stream. Losses of volatile organics to the atmosphere in both the soil and groundwater actions will be controlled by carbon adsorption, if necessary. Health-based standards for groundwater and leaching standards for soils have been established. In addition, the site is currently listed on the State Abandoned or Uncontrolled Sites Registry (SAUSR). Substantial change or transfer of property on this registry is prohibited without written approval of the Director of the Iowa Department of Natural Resources. The selected remedy is believed to be capable of

achieving the cleanup standards which would constitute final action for this site.

1.4 Declaration of Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and it satisfies the statutory preference for remedies that employ treatment that reduce toxicity, mobility, or volume as their principal element. Because this remedy will result in hazardous substances (below health-based standards) remaining on site, a review will be conducted within five years of commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

MORRIS KAY, REGIONAL ADMINISTRATOR
ENVIRONMENTAL PROTECTION AGENCY, REGION VII

9-20-89
DATE

ALLAN STOKES, ADMINISTRATOR
IOWA DNR, ENVIRONMENTAL PROTECTION DIV.

Sept. 14, 1989
DATE

DECISION SUMMARY FOR THE RECORD OF DECISION

2.0 Site Name, Location, and Description

The Vogel Paint and Wax Company (VPW) is located about two miles south and a mile west of the town of Maurice, in Sioux County, Iowa. Figure 1 shows the general site location.

The site's legal address is: NW 1/4, Sec. 29, Township 94, Range 45 west.

2.1 Site History and Enforcement Activities

The site is located in a rural area on the uplands of the West Branch Floyd River. Adjacent land uses are primarily for cropland. The one-eighth section owned by VPW is partially used for cropland. An unnamed intermittent stream flows to the northeast through the northwest portion of the VPW one-eighth section and discharges to the West Branch Floyd River about a mile away. (See Figures 2 and 3.) The West Branch Floyd River is classified for protection of wildlife, aquatic life, and secondary body contact (e.g., wading).

A surficial sand and gravel aquifer and Dakota sandstone bedrock aquifer underlie the site. The sand and gravel aquifer supplies nearby private wells and the Southern Sioux County Rural Water System located about a mile and a half southeast of the site. Wells in the surficial aquifer are typically less than 50 feet deep. The Dakota sandstone is the primary bedrock aquifer in the region. Dakota wells are typically 250 to 450 feet deep. The surficial aquifer has been identified as the primary route of contaminant migration from the site. Ground water has been found to flow in a southerly to southeasterly direction which is different from the surface topography.

The closest communities are Maurice (1980 population of 288) located about two miles to the north-northeast of the site and Struble (1980 population of 59) located about two and a half miles south of the site. The Southern Sioux County Rural Water System serves approximately 3200 people. Private rural residences exist within about a quarter mile northwest and southwest of the site. Figure 2 is a map of the vicinity.

The site itself consists of an approximate two acre disposal area which has been covered with clay. Monitoring wells are the only site structures. Figure 3 is a site map.

Prior to its use for waste disposal, the northern half of the site contained a gravel pit and the remainder of the site was tilled for agricultural purposes. In 1971 Vogel Paint and Wax Company, Inc.

FIGURE 1
LOCATION MAP

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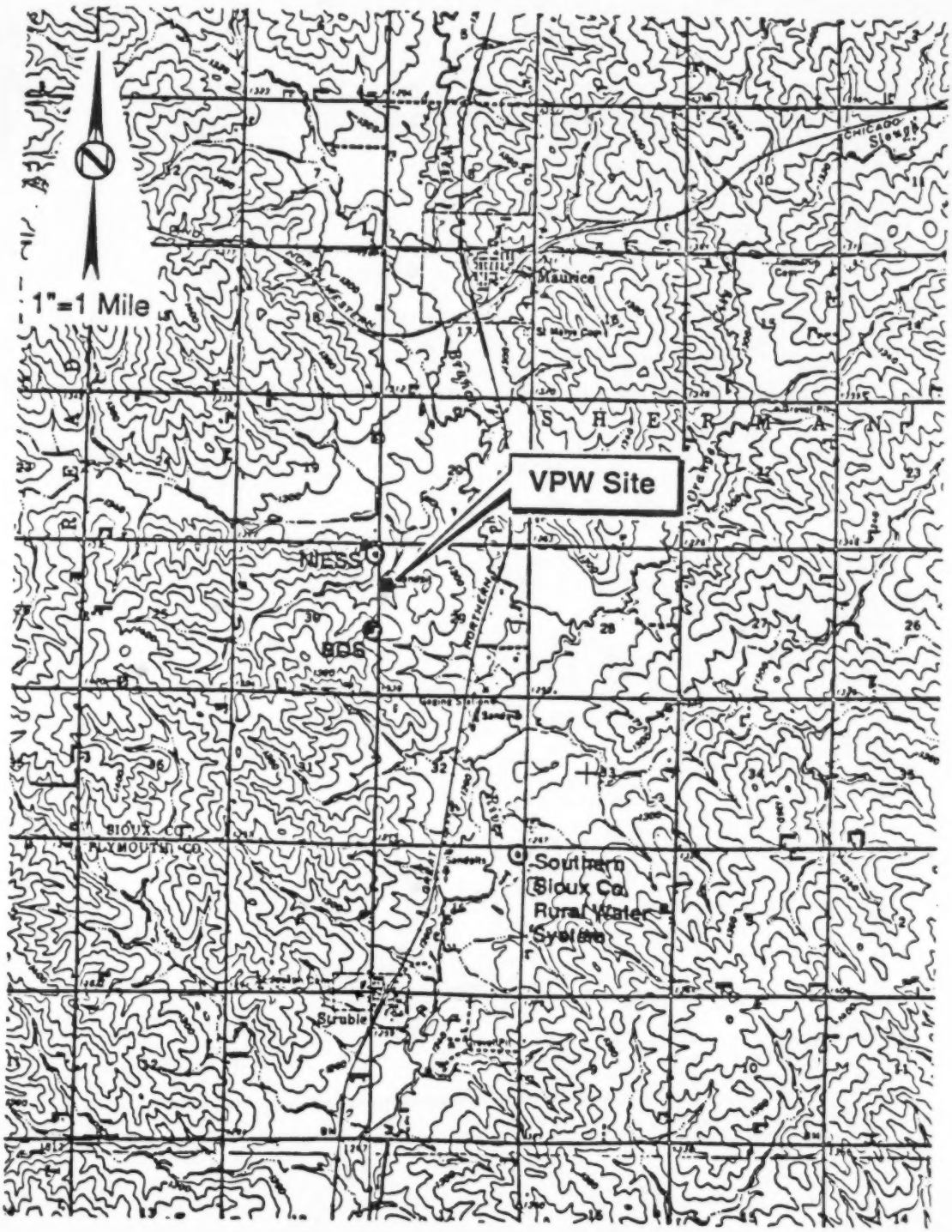

FIGURE 2
VICINITY MAP
3b

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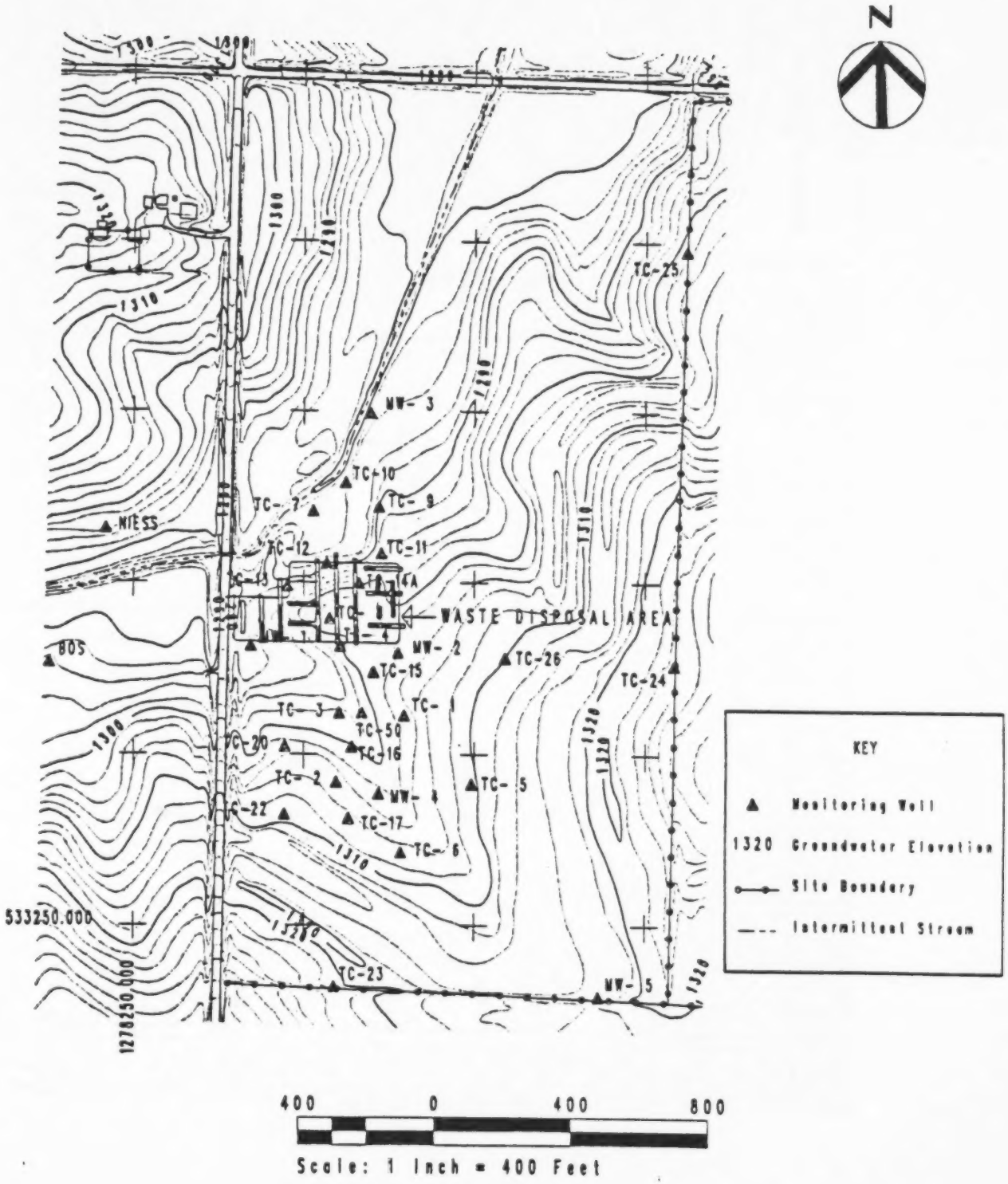

FIGURE 3
SITE MAP
3c

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(VPW) of Orange City, Iowa began using the site for waste disposal. Paint sludge, resins, solvents and other paint manufacturing wastes were disposed of at the site until 1979. Such disposal was not prohibited at that time. The disposal area encompasses about two acres of the 80-acre tract owned by VPW. (See Figure 3.) Liquid wastes were dumped into twelve or more trenches eight to twelve feet in depth. The trenches were left open for an extended period of time to allow volatilization of solvents. Filled or partially filled drums and other debris were then dumped on top of the liquid wastes, and the trenches were covered with one to two feet of soil. Solid wastes such as wooden pallets and packing materials were disposed of in the former gravel pit after several feet of clayey silt soil was placed on the floor of the pit.

Data from company records indicate that approximately 43,000 gallons of aliphatic and aromatic hydrocarbons have been buried at the site, primarily including toluene, xylene, ethylbenzene, methyl ethyl ketone, and mineral spirits. An estimated 6,000 pounds of mercury, lead, zinc and chromium have been disposed of at the site.

The estimated quantities of materials delivered to the site are:

Solvents	43,000	gallons
Lead	3,900	pounds
Mercury	7	pounds
Zinc	1,500	pounds
Chromium	600	pounds

Assuming that two-thirds of the solvents were poured into the trenches, and 60 percent was released to the atmosphere by volatilization, approximately 11,500 gallons of free solvents would remain in the trenches to potentially enter the soil and groundwater.

In the Spring of 1979 the State of Iowa received complaints of paint waste disposal at the VPW site about 1.5 miles north of a proposed rural water district well field. The State conducted initial investigations at the site in 1979. In late 1979 VPW initiated additional investigations at the State's request. The site was placed on the National Priorities List (NPL) in 1984. Since 1979 VPW has conducted numerous investigations in cooperation with the State. The Remedial Investigation and Feasibility Study were conducted in accordance with a Consent Order between VPW and the Iowa Department of Natural Resources (DNR) effective June 1987.

2.2 Highlights of Community Participation

The Remedial Investigation and Feasibility Study Reports and the Proposed Plan for the Vogel site were released to the public for comment on August 10, 1989. These two documents were made available to the public in both the administrative record and an information repository maintained at DNR Records Center, 5th Floor, Wallace Building, 900 East Grand, Des Moines, Iowa, and in the Orange City Public Library.

The notice of availability for these two documents was published in the Sioux City Journal on August 10, 1989. A public comment period on the documents was held from August 10, 1989 to August 31, 1989. In addition, a public meeting was held on August 21, 1989. At this meeting, representatives from DNR, EPA, and Vogel Paint and Wax Company answered questions about problems at the site and the remedial alternatives under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this ROD.

2.3 Scope and Role of Response Actions Within Site Strategy

The selected response actions independently address two affected media, i.e., solid waste/soil and groundwater. The solid waste and contaminated soils in the disposal area are a source of contaminants leaching into groundwater. Wastes were covered with clay in 1984 and pose no threat due to direct contact. The cleanup objective for solid waste/soils is to reduce migration of contaminants into groundwater by removal and/or treatment of the source, i.e., the contaminated soils/solid waste.

Contaminated groundwater is a potential threat to current and future drinking water supplies. To a lesser degree, other environmental risks could result from the eventual discharge of contaminated groundwater to surface streams. The cleanup objective for groundwater will be to reduce contaminants in groundwater to established health-based standards for drinking water.

The response actions selected in this ROD address all principal threats posed by this site and are intended to constitute final actions for the site.

2.4 Summary of Site Characteristics

A wide variety of contaminants have been detected in various media at the site; including several potential carcinogens. Table 1 summarizes contaminants found in groundwater, surface water, and soil. Groundwater contaminants are limited to well-defined plumes which do not appear to be expanding. Figures 4-7 show contaminant plume configurations. The ground water flow is likely to be in a northerly direction in the upper sand unit. In the lower sand and gravel unit, ground water flows in an easterly direction north of

direction south of the disposal area (See Figure 8.) Since March of 1984, two wells have been used to remove floating hydrocarbons. This activity has reduced the thickness of the floating hydrocarbon layer from 12.4 to 1.7 feet.

In general, no significant surface water contamination has been detected and soil contamination is concentrated in the two acre disposal area. Currently there are no populations at risk. However, contaminated groundwater is a potential threat to current and future drinking water supplies.

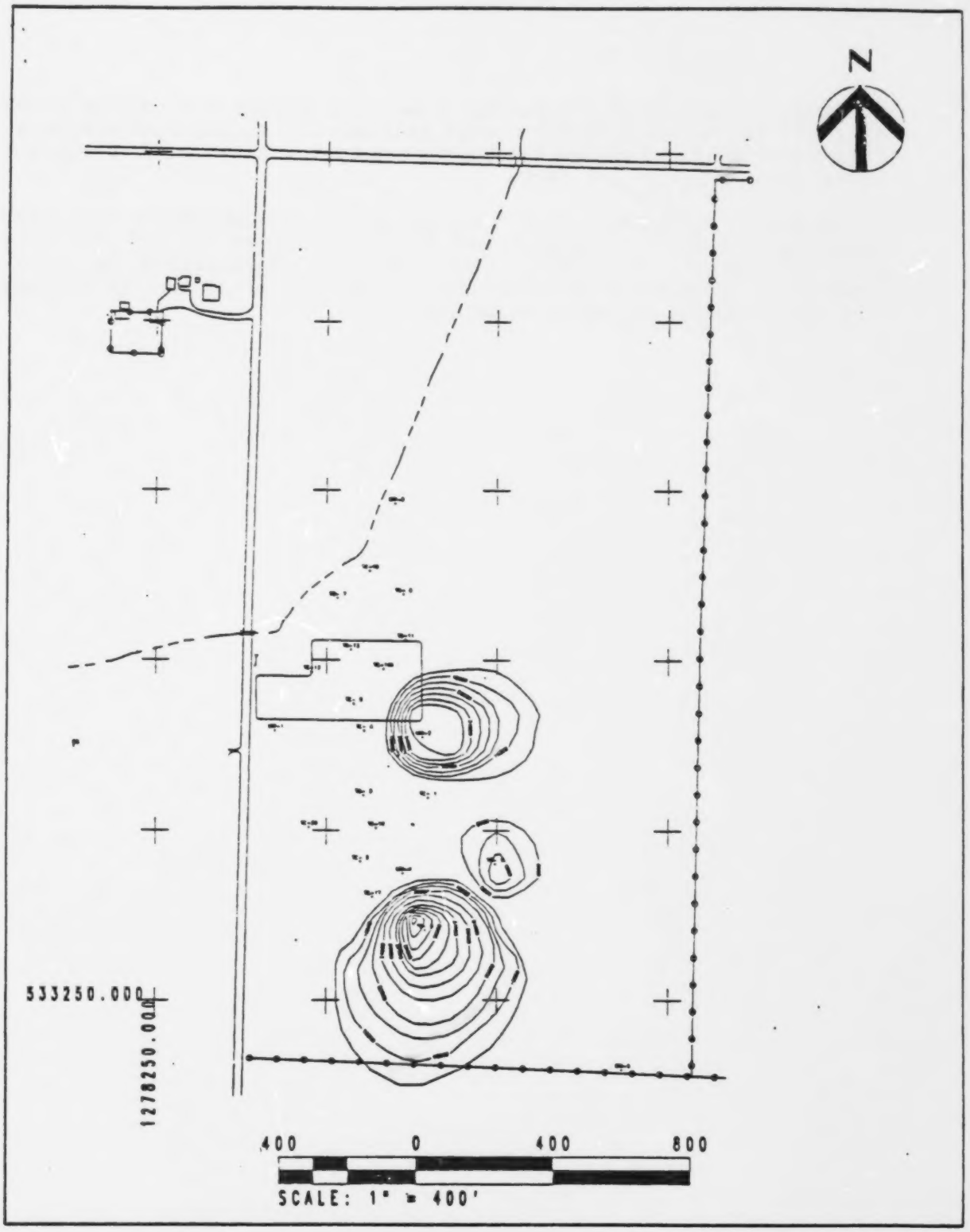


FIGURE 4
ETHYLBENZENE ISOCONCENTRATION MAP (1-18-89)

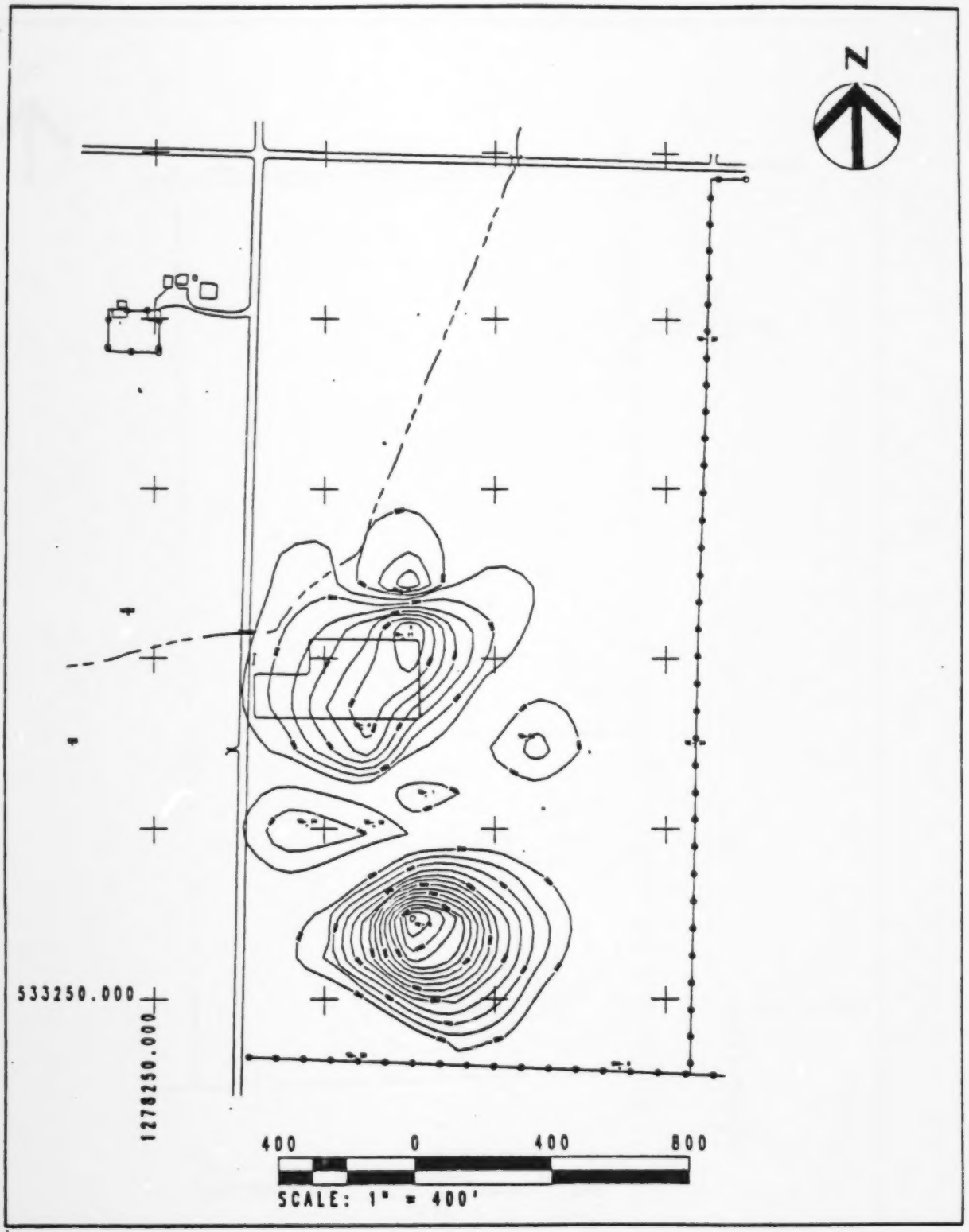


FIGURE 5
MEK ISOCONCENTRATION MAP (1-18-89)

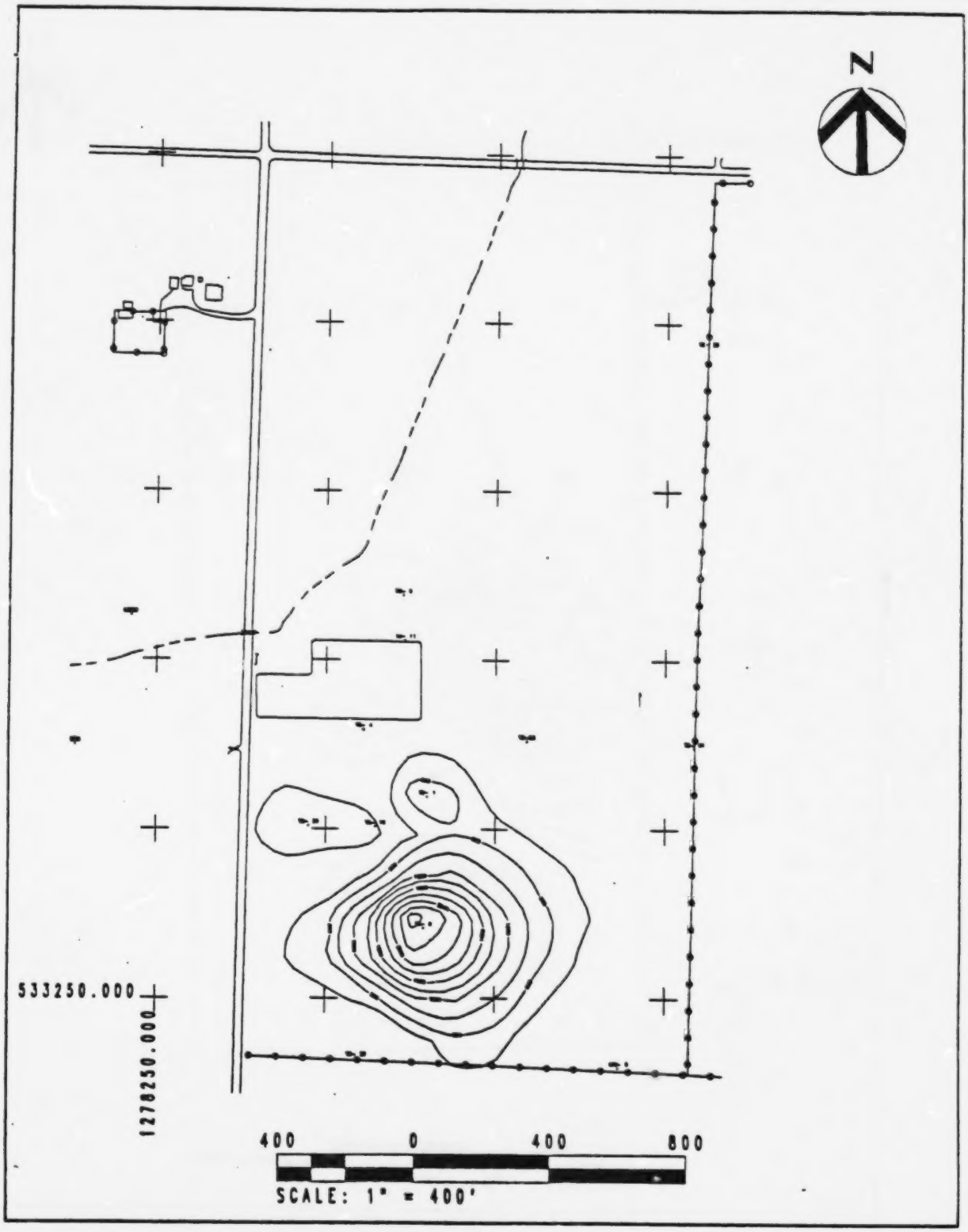


FIGURE 6
TOLUENE ISOCONCENTRATION MAP (1-18-89)

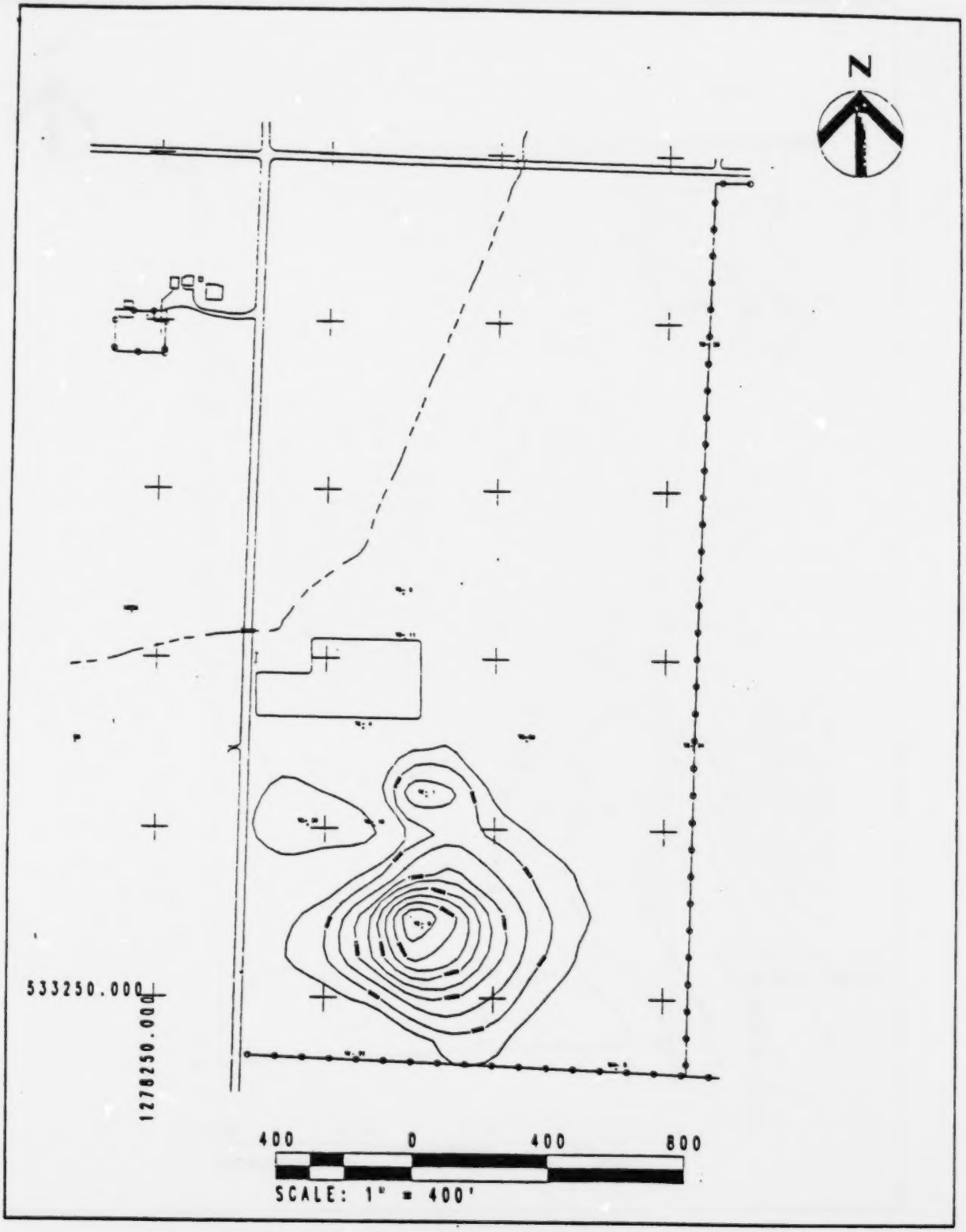


FIGURE 7
XYLENE ISOCONCENTRATION MAP (1-18-89)

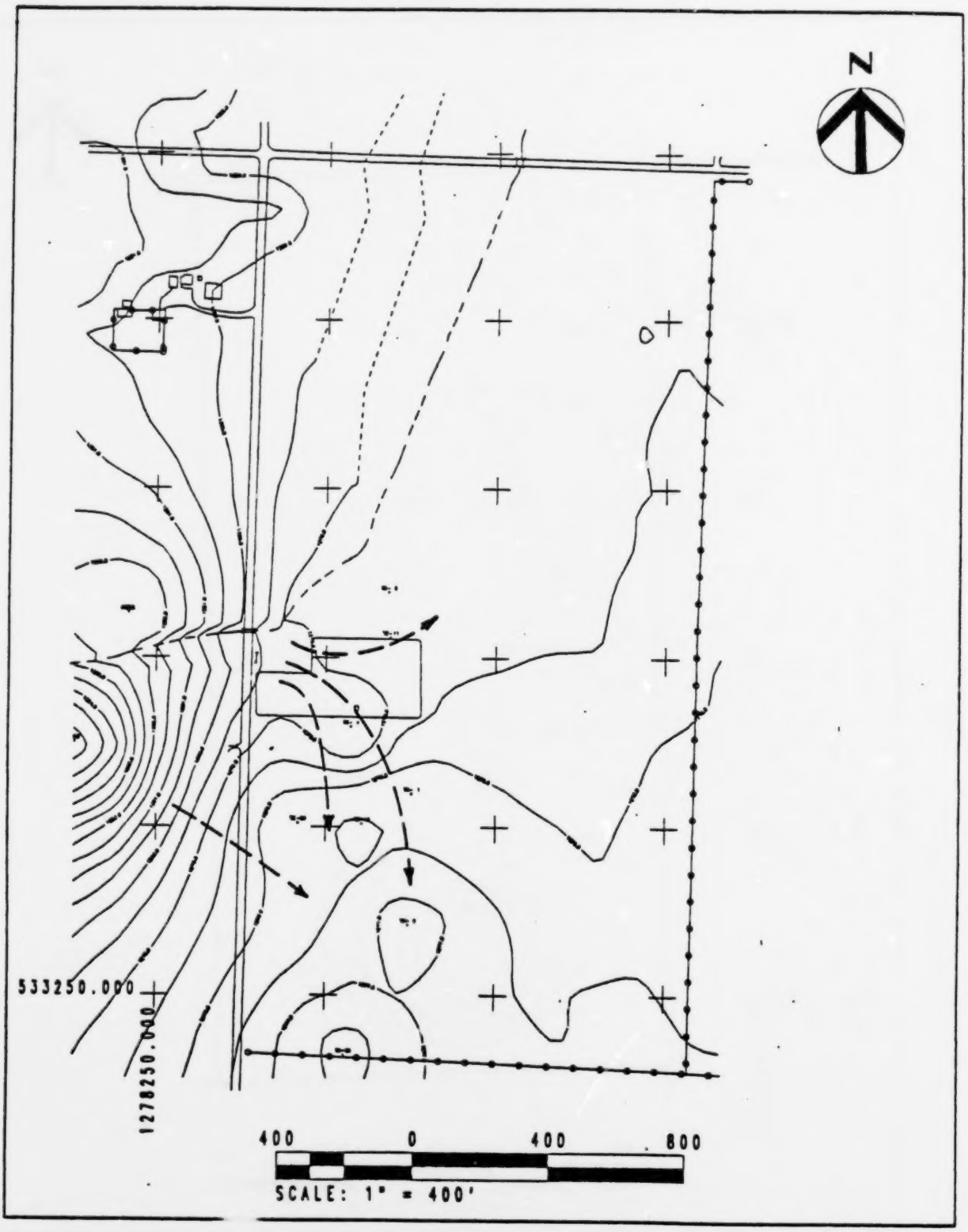


FIGURE 8
GROUNDWATER FLOW MAP (1-17-89)

TABLE 1

CONCENTRATION VALUES IN VARIOUS ENVIRONMENTAL MEDIA

Chemical	Groundwater (ppm) Range	Groundwater (ppm) Mean	Surface Water (ppm) Range	Soil* (mg/kg) Mean	Soil* (mg/kg) Range	Soil* (mg/kg) Mean
Arsenic(PC)	NA	NA	NA	NA	4.8-12.1	7.6
Beryllium(PC)	0.02-0.02	0.02	NA	NA	NA	NA
Cadmium	BDL-0.07	0.02	BDL-BDL	BDL	0.2-6.4	1.1
Chromium III	BDL-0.08	0.001	BDL-0.012	0.004	4.9-21,000 (44)	1240 (14.8)
Lead	BDL-0.32	0.007	BDL-0.026	0.009	5.2-41,000 (140)	4600.0 (26.6)
Mercury	BDL-0.11	0.0005	BDL-BDL	BDL	BDL-65 (0.04)	4.4 (0.07)
Nickel	NA	NA	NA	NA	10.3-25.9	14.8
Zinc	BDL-0.24	0.07	0.03-0.04	0.02	15.5-12,000	826.0 (44.3)
Bis(2-Ethylhexyl) Phthalate	NA	NA	NA	NA	1.7-6.6	3.4
Dibutyl Phthalate	NA	NA	NA	NA	BDL-0.30	0.30
Acetone	BDL-0.28	0.13	NA	NA	BDL-0.37	0.12
Benzene(PC)	BDL-0.11	0.05	NA	NA	0.1-8.0	1.2
Chloroform(PC)	NA	NA	NA	NA	BDL-0.007	0.006
Dichloro-methane(PC)	BDL-0.42	0.21	NA	NA	BDL-0.14	0.04
1,2-Dichloro-propane(PC)	BDL-0.07	0.03	NA	NA	NA	NA
Ethylbenzene	BDL-67	5.2	BDL-0.0036	0.0006	BDL-976	90
Methyl Ethyl Ketone	BDL-120	3.7	BDL-0.037	0.006	BDL-0.51	0.51
Methyl Isobutyl Ketone	BDL-0.62	0.31	NA	NA	BDL-0.87	0.32
Toluene	BDL-37	3.8	BDL-0.0014	0.0002	BDL-1711	145
Trichloro-ethylene(PC)	BDL-0.01	0.006	NA	NA	BDL-0.059	0.04
Xylenes	BDL-260	20	BDL-0.013	0.002	BDL-704	57

NA = Not Available
BDL = Below Detection Limit
PC = Potential Carcinogen
* Mean soil values for Chromium, Lead, Mercury and Zinc are skewed due to five of thirty-one samples. Values shown in parentheses do not include results from these five samples, and are as follows: Chromium - 9,400 mg/kg; Lead - 28,300 mg/kg; Mercury - 21.6 mg/kg; and Zinc - 4,900 mg/kg.

2.5 Summary of Site Risks

The U.S. Public Health Service Agency for Toxic Substances and Disease Registry conducted a Health Assessment for the VPW site. They concluded that the condition of the site does not pose an immediate public health threat. The site is covered and located in a rural area. Because of these conditions, direct exposure to contaminants does not occur. However, the potential for off-site migration of contaminants into the groundwater may lead to a future public health threat.

An Endangerment Assessment was conducted as part of the remedial investigations. This Endangerment Assessment provided a baseline risk assessment to assist in the development of remedial alternatives. It concluded that there is no potential for significant exposure to contaminants via soil, surface water, or air. Exposure pathways have been identified via groundwater taken from the two residential wells just west of the site; however, when contaminants have been detected in these two wells, the concentrations have been below health-based drinking water standards and no increasing trend has been observed. Volatile organic contaminants have been observed at the site boundary at concentrations which do not pose a significant threat to public health or the environment. However, Cadmium, Methyl Ethyl Ketone, Ethylbenzene, and Xylenes (all non-carcinogens) have been detected within the area of groundwater contamination at concentrations high enough to pose a subchronic and/or chronic risk to humans if they were to ingest this water. Benzene, a carcinogen, has also been detected in site groundwater.

Potential risks from drinking contaminated groundwater were calculated in the Endangerment Assessment and are summarized in Table 2. These hazards were based upon consumption of mean contaminant concentrations found in on-site monitoring wells, except for benzene in which case the maximum level found was used. Therefore, the potential hazards presented in Table 2 do <u>not</u> represent current exposure to any person. As stated previously, no significant off-site hazard has been identified; however, the potential for migration of contaminant in groundwater does exist which could impact a drinking water supply in the future.

TABLE 2

SUMMARY OF POTENTIAL HAZARDS FROM CONSUMPTION OF CONTAMINATED GROUNDWATER

Chemical	EDI	RfD	HQ	CPF	ELC
Cadmium	5.8×10^{-4}	2.9×10^{-4}	2.0	---	---
Chromium	11.6×10^{-5}	1.00	11.6×10^{-5}	---	---
Lead	8.7×10^{-4}	1.40×10^{-3}	6.21×10^{-1}	---	---
Mercury	1.5×10^{-5}	2.00×10^{-3}	7.25×10^{-3}	---	---
Benzene	3.2×10^{-3}	---	---	5.2×10^{-2}	1.7×10^{-4}
Ethylbenzene	22.6×10^{-2}	5.00×10^{-2}	4.52	---	---
Methyl Ethyl Ketone	21.2×10^{-2}	5.00×10^{-2}	4.23	---	---
Toluene	20.3×10^{-2}	3.00×10^{-1}	6.77×10^{-1}	---	---
Xylenes	86.4×10^{-2}	1.00×10^{-2}	86.4	---	---

Hazard Index ----------98.5
Total Excess Lifetime Cancer Risk----------1.7×10^{-4}

EDI - Estimated Daily Intake
RfD - Reference Dose
HQ - Hazard Quotient
CPF - Cancer Potency Factor
ELC - Excess Lifetime Cancer Risk

NOTE: See text for description of these parameters

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals, that are not likely to be without an appreciable risk of adverse health effects. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. HI values less than one are acceptable.

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., $1x10^{-6}$). An excess lifetime cancer risk of $1x10^{-6}$ indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

This site has not been found to currently pose any significant environmental risks. Contaminants have not migrated far. Low

levels of contaminants have occasionally been detected in the adjacent intermittent stream. There are no critical habitats or endangered species affected by site contaminants.

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, however, present an imminent and substantial endangerment to public health, welfare, or the environment.

2.6 Description of Alternatives

Soil and Groundwater remedial alternatives have been evaluated separately. One soil and one groundwater alternative have been chosen to constitute complete remedial action for the site.

The alternatives for soil and groundwater cleanup which have been evaluated are listed below. The "S: refers to soil alternatives and the "GW" refers to groundwater.

- o Alternative S-1: Excavation and Off-site Incineration and Disposal
- o Alternative S-2: Excavation, On-Site Thermal Treatment, Soil Stabilization (if needed), and On-Site Disposal
- o Alternative S-3: Excavation, On-Site Bioremediation, Soil Stabilization (if needed), and On-Site Disposal
- o Alternative S-4: No Action - Soils
- o Alternative GW-1: Pumping, Air Stripping, and Discharge to Surface Water
- o Alternative GW-2: In-Situ Bioremediation
- o Alternative GW-3: No Action - Groundwater

Common Elements: All of the soil alternatives except the "No Action" alternative include excavation of about 3,000 cubic yards of contaminated soils. Temporary on-site storage of excavated materials would be utilized, if necessary. Waste material other than soil (e.g, drums and debris) would be isolated, decontaminated, and shipped to a municipal landfill for disposal if it can be rendered non-hazardous, otherwise it would be disposed of in a hazardous waste landfill or incinerated off-site. In addition, free liquids in the excavation would be removed and stored in temporary tanks prior to ultimate off-site treatment by incineration or recycling. All groundwater alternatives include monitoring to ensure contaminants are not moving off-site. Dust control and/or air monitoring would be conducted for all on-site activities in which the potential for release of contaminants to

air exists. All alternatives also include listing of the site on the State Abandoned or Uncontrolled Sites Registry which has already been done. A listing on this registry is filed with the county recorder and requires the owner to obtain written approval from the Director of DNR prior to selling or substantially changing the site. Other previous actions which are common to all alternatives include the two feet thick clay cover placed on the waste disposal area and continued floating hydrocarbon removal.

ALTERNATIVE S-1
EXCAVATION AND OFF-SITE DISPOSAL

Capital Cost: $6,390,000
Annual Operation and Maintenance (O&M) Cost: 0
Present Worth (PW) Cost: $6,390,000
Months to Implement: 2

The contaminated soil would be excavated, transported to and incinerated at an approved incineration facility as regulated by 40 CFR Part 264. Metals in ash resulting from incineration would be stabilized if necessary prior to final disposal. Clean soil would be used to backfill the excavation and the area would be revegetated. With this alternative, all contaminants would be removed and there would be no need for long-term maintenance.

ALTERNATIVE S-2;
EXCAVATION, ON-SITE THERMAL TREATMENT
(STABILIZATION), AND ON-SITE DISPOSAL

Capital Cost: $2,045,000
Annual O & M Cost: $1,000 (30 yrs.)
PW Cost: $2,060,000
Months to Implement: 1-3

Low temperature thermal treatment of contaminated soil would be used to drive off volatile organic compounds by mixing of excavated soils in a rotary kiln at temperatures of 600^0-800^0 F. The organic contaminants in the hot exhaust from this process would be destroyed by an afterburner. This process would not treat metals in the soil and the residual soil may require stabilization (e.g., mixing with lime or cement) to prevent leaching of metals to groundwater. Treated, stabilized soil would be redeposited in the excavation, covered with clean soil, and revegetated. Treatment standards to be met prior to disposal would be at health-based levels. For metals, the levels are based on Extraction Procedure Toxicity standards. For organic compounds, the levels are based on Toxicity Characteristic Leaching Procedure standards, with a limit of 100 ppm total organic hydrocarbons. Operation and maintenance of this site would be minimal efforts involving periodic site inspections and repairing any erosional damage.

ALTERNATIVE S-3:
(STABILIZATION), AND ON-SITE DISPOSAL

Capital Cost: $1,370,000
Annual O&M Costs: $1,000 (30 years)
PW Cost: $1,385,000
Months to Implement: 6-12

This alternative is the same as Alternative S-2, except that bioremediation of soils would be utilized instead of thermal treatment. Bioremediation of soils would involve a fully contained surface impoundment system complying with minimum technology standards using conventional soil management practices (e.g., nutrient addition and soil aeration) to enhance microbial degradation and volatilization of organic contaminants. The system would be designed to contain and treat soil leachate and volatilized contaminants. The treatment system would be about one acre in size consisting of a double-lined treatment bed, leachate collection system, groundwater monitoring, and a modified plastic-film greenhouse cover. Leachate would recycled back to the treatment area. Excess leachate would be collected for off-site treatment (e.g., municipal wastewater treatment plant). Vapors would pass through activated carbon to absorb organics prior to release. Spent activated carbon would be regenerated, if possible, or sent to an approved landfill.

High concentrations of heavy metals may prohibit use of this process. A trial run treatability study would be necessary prior to implementation. If small quantities of soils are identified as containing high levels of heavy metals which are incompatible with bioremediation, these soils would be isolated for off-site treatment and/or disposal at an approved hazardous waste disposal facility. If high concentrations of heavy metals pose excessive restrictions on the use of bioremediation, Alternative S-2 utilizing thermal treatment of soils would be implemented in its place.

ALTERNATIVE S-4:
NO ACTION - SOILS

Capital Cost: $2,500
Annual O&M Cost: 0
PW Cost: $2,500
Months to Implement: 0

The Superfund program requires that the "no action" alternative be evaluated at every site to establish a baseline for comparison. Under this alternative no "additional" action would be taken regarding soils. Previous covering of the disposal area with two feet of clay and listing of the site on the State Abandoned or Uncontrolled Sites Registry are actions which have already been

implemented. This alternative does include the minor cost of placing a fence around the site.

ALTERNATIVE GW-1:
PUMPING, AIR STRIPPING, AND DISCHARGE TO SURFACE WATER

Capital Cost: $320,000
Annual O&M Costs: $53,600 (3 yrs.)
PW Cost: $466,000
Months to Implement: 36+

Contaminated groundwater would be removed by pumping from one or more wells. This well (or wells) would be located and sized to draw water from the entire area of groundwater contamination thereby preventing any off-site migration of groundwater contaminants. A pumping test would be conducted during the remedial design to determine aquifer characteristics. This information would be used to design the pumping system, i.e., number and location of wells, pumping rates, and gradient controls. The pumped water would be run through an air stripper to remove in excess of 95% of the volatile organic contaminants. Air stripping is a well-established process in which water is cascaded through a column packed with an inert media (e.g., plastic balls) and air is forced through the column in a counter direction. Volatile organics are stripped from the water and included in the air discharged from the top of the column. Carbon adsorption would be used to remove contaminants in the air discharged from an air stripper, if necessary to meet air quality standards. Treated water, meeting water quality standards, from the air stripper would be discharged to the nearby unnamed stream. If water from the air stripper does not meet water quality standards, additional treatment would be provided, as necessary. The need for additional treatment, however, is not anticipated. Pumping and treatment would continue as long as necessary to reduce contaminant levels to established cleanup levels.

ALTERNATIVE GW-2:
IN-SITU BIOREMEDIATION

In-situ bioremediation of groundwater involves enhancing the natural biodegradation process by means such as nutrient injection, aeration, and introduction of cultured bacterial strains. Natural biological activity is capable of degrading organic contaminants to innocuous compounds. Such a process would involve careful monitoring and control of conditions to enhance biogradation until contaminant levels are reduced to established cleanup levels. This alternative would not address metals in groundwater. However, existing levels of metals are largely in compliance with health-based drinking water standards.

ALTERNATIVE GW-3:
NO ACTION - GROUNDWATER

Capital Cost: $30,000
Annual O&M Costs: $4,600 (30 yrs.)
PW costs: $101,000
Months to Implement: 0

As with the soil "no action" alternative, this alternative is required in the Superfund program to establish a baseline for comparison. Under this alternative no "additional" action would be taken regarding groundwater. However, current activities including monthly removal of floating hydrocarbons and quarterly groundwater sampling would be continued indefinitely. The listing on the State Abandoned and Uncontrolled Sites Registry could prevent future withdrawals of groundwater from the site. The site could be reactivated if monitoring results indicated migration of contaminants from the site.

2.7 Summary of Comparative Analysis of Alternatives

Table 3 summarizes the comparison of alternatives against the nine evaluation criteria which are discussed in more detail below.

Overall Protection: No immediate threat has been identified, the extent of groundwater contamination does not appear to be expanding, monitoring will be required of all alternatives, institutional controls are in place, and direct contact with contaminated soils is not a threat. Therefore, all of the alternatives would provide adequate protection to human health and the environment. All of the alternatives, except the "no action" alternatives, accomplish this by reducing the amounts of contaminants through treatment or removal. The "no action" alternatives provide a much lesser degree of overall protection because much larger amounts of contaminants would remain on site. Alternative GW-2 involving in-situ bioremediation may have a somewhat lower degree of overall protection because the level of effectiveness is uncertain. The proposed alternatives would significantly reduce the source of contaminants and levels of contaminants in groundwater to below health-based standards for drinking water.

Compliance with ARARS: All alternatives, except the "no action" alternatives, should meet their respective applicable or relevant and appropriate requirements of Federal and State environmental laws. The groundwater "no action" alternative would not meet groundwater cleanup standards. Alternatives S-2 and S-3 involving on-site soil disposal should be able to meet federal land disposal requirements ("Land Ban") by treatment of wastes to health-based levels.

TABLE 3

SUMMARY EVALUATION OF REMEDIAL ALTERNATIVES

SOIL ALTERNATIVES

Alternative	Long-term Effectiveness	Reduction of T,M & V	Short-term Effectiveness	Implement-ability	Present Worth Cost (Dollars)	Compliance with ARARs	Overall Protection	State Acceptance	Community Acceptance
S-1	High	High	Medium	High	6,390,000	Yes	High	---	---
S-2	High	High	Medium	High	2,060,000	Yes	High	Yes	Yes
S-3	High	High	Medium	Medium	1,385,000	Yes	High	Yes	Yes
S-4	Low	Low	High	High	2,500	No	Low	---	---

GROUNDWATER ALTERNATIVES

Alternative	Long-term Effectiveness	Reduction of T,M & V	Short-term Effectiveness	Implement-ability	Present Worth Cost (Dollars)	Compliance with ARARs	Overall Protection	State Acceptance	Community Acceptance
GW-1	High	High	Medium	High	466,000	Yes	High	Yes	Yes
GW-2	Medium	Medium	Medium	Medium	624,000	Yes	Medium	---	---
GW-3	Low	Low	High	High	101,000	No	Low	---	---

KEY:

Alternative	Description
S-1	Excavation and Off-Site Incineration
S-2	Excavation, (On-Site Storage), On-Site Thermal Treatment, (Stabilization), On-Site Disposal
S-3	Excavation, (On-Site Storage), On-Site Bioremediation, (Stabilization), On-Site Disposal
S-4	No-Action and Institutional Controls
GW-1	Pumping, Air Stripping, and Discharge to Surface Water
GW-2	In-Situ Bioremediation
GW-3	No-Action, Institutional Controls, and Long-Term Monitoring

Long-Term Effectiveness and Permanence: Alternative S-1 would remove all contaminated soil and wastes from the site for treatment and disposal, thereby eliminating long-term risks at the VPW site and minimizing off-site risks. Alternative S-2 and S-3 would both provide a high degree of long-term effectiveness by eliminating most volatile organic contaminants and stabilizing residual soils, if necessary, to prevent leaching of metals which will not be removed by treatment.

The "no action" alternatives S-4 and GW-3 provide the least assurance of long-term effectiveness and permanence since all contaminants will remain on-site with only minimal control (i.e., floating hydrocarbon removal).

Alternative GW-1 would provide a high degree of long-term effectiveness and permanence by removal of groundwater contaminants. Successful in-situ bioremediation, Alternative GW-2, could also be very effective; however, it is not able to address metals in groundwater and its ability to achieve low concentrations is uncertain.

Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment: Alternatives S-3 and GW-2 involving bioremediation and S-1 involving incineration offer the greatest potential for reduction of contaminants through treatment. However, Alternative GW-2 has a high degree of uncertainty as to its ultimate effectiveness.

The "no action" alternatives S-4 and GW-3 rank very low with respect to this criterion. However, the "no action" alternative for groundwater (GW-3) would provide some reduction in contaminant volume through continued floating hydrocarbon recovery.

Alternatives S-2 and S-3, on-site thermal treatment of soils and on-site bioremediation and GW-1, air stripping of groundwater, would greatly reduce volume of contaminants on-site but would be transferring contaminants to the air. Air emissions would be mitigated by carbon adsorption or use of an afterburner for thermal treatment if necessary to meet air quality standards. Spent carbon would either be landfilled in which case the mobility of the contaminants would be greatly reduced, or regenerated (incinerated), in which case the volume of contaminants would be greatly reduced. An afterburner would destroy most organic contaminants.

None of the soil alternatives are capable of reducing the volume or toxicity of metals. However, Alternatives S-1, S-2 and S-3 would reduce the mobility of metals through stabilization, if necessary.

Short-Term Effectiveness: All of the active soil alternatives can be completed in a relatively short period of time with off-site incineration/disposal, Alternative S-1, taking the least time and on-site bioremediation taking the most time. These three soil alternatives all involve excavation of soils and wastes which would create potential for worker exposure, dust, and volatization of contaminants into the air. The off-site Alternative (S-1) would have a significant short-term risk due to transportation. Alternatives S-2 and S-3 would have potential for short-term air emissions during treatment. However, such emissions would be mitigated by engineered controls, if necessary to meet air quality standards.

Groundwater Alternative GW-1 would likely prove more effective during the short-term than Alternative GW-2 because pumping would provide a positive control thus preventing contaminant movement. Since no immediate risks exist and groundwater contamination does not appear to be expanding at present, any difference in those two alternatives regarding short-term effectiveness in removing groundwater contaminants is not significant. Alternative GW-1, involving pumping and air stripping may, however pose short-term risks due to discharge of contaminants to the air and surface water. Those risks would be mitigated by carbon adsorption of air emissions and/or additional water treatment, if necessary, to prevent significant risks to human health or the environment.

The "no action" alternatives (S-4 and GW-3) accomplish little in the short-term. On the other hand, no immediate risk has been identified and the "no action" alternatives will not create any short-term risks during implementation; therefore, short-term effectiveness is high.

Implementability: The "no action" alternatives (S-4 and GW-3) are obviously the easiest to implement. Of the remaining soil-related alternatives, off-site treatment/disposal (Alternative S-1) would be the easiest to implement, followed by one-site thermal treatment (Alternative S-2). Alternative S-3 would be the most difficult to implement since additional testing would be required and design considerations would be most involved.

Of the two active groundwater related alternatives, Alternative GW-1, would be the easiest to implement. In-situ bioremediation of groundwater has many potential implementability problems.

Cost: Obviously the "no action" alternatives (S-4 and GW-3) have by far the lowest costs. The off-site treatment disposal option (S-1) is the highest cost soil-related alternative. Alternative S-3 has a significantly lower cost than the on-site thermal treatment option, Alternative S-2. None of the soil-related alternatives have significant operation and maintenance costs.

The initial costs of Alternative GW-1, involving pumping and air-stripping, is estimated to be slightly higher than for in-situ bioremediation of groundwater (Alternative GW-3); however, much lower operating costs are expected for Alternative GW-1 resulting in significantly lower overall (present worth) costs.

State Acceptance: The Iowa Department of Natural Resources authored the proposed Plan and recommends the preferred alternative without comment.

Community Acceptance: Very little public comment was received. Several comments were received at the public meeting, none of which expressed dissatisfaction with the preferred alternative. A Responsiveness Summary addressing all comment received at the public meeting is attached.

2.8 Selected Remedy

The selected remedy is Alternative S-3 involving on-site bioremediation of soils coupled with Alternative GW-1 involving pumping and air stripping of groundwater.

The selected remedy will include the following ancillary activities:

- Continued listing and restrictions associated with the State Abandoned or Uncontrolled Sites Registry until no further threat remains.
- Continued floating hydrocarbon removal until no appreciable amounts can be recovered.
- Removal of the uncontaminated cover soil and temporary storage of the material in a protected area.
- Removal of solid waste material, other than contaminated soil (e.g., drums, paint cans, wooden pallets, paint solids, general trash), from the disposal trenches and temporary storage in a protected area.
- Ultimate disposal of the solid waste material in a municipal landfall if the material is non-hazardous or can be made non-hazardous through decontamination. Ultimate disposal in a hazardous waste landfill or off-site incineration of this material may be warranted if the material is hazardous and cannot be made non-hazardous.
- Removal of free solvent liquids from the excavation and temporary storage in tanks, and off-site recycling of the solvent, if possible, or off-site incineration.

- o For "clean closure" soils must pass the EP Toxicity test for leachable metals (40 CFR 261.24), the TCLP test for leachable organics (40 CFR 268.41) and shall not contain more than 100 mg/kg of Total Organic Hydrocarbons prior to final placement.

- o An air monitoring program approved by the DNR will be implemented during all site work.

- o Dust control will be provided during excavation.

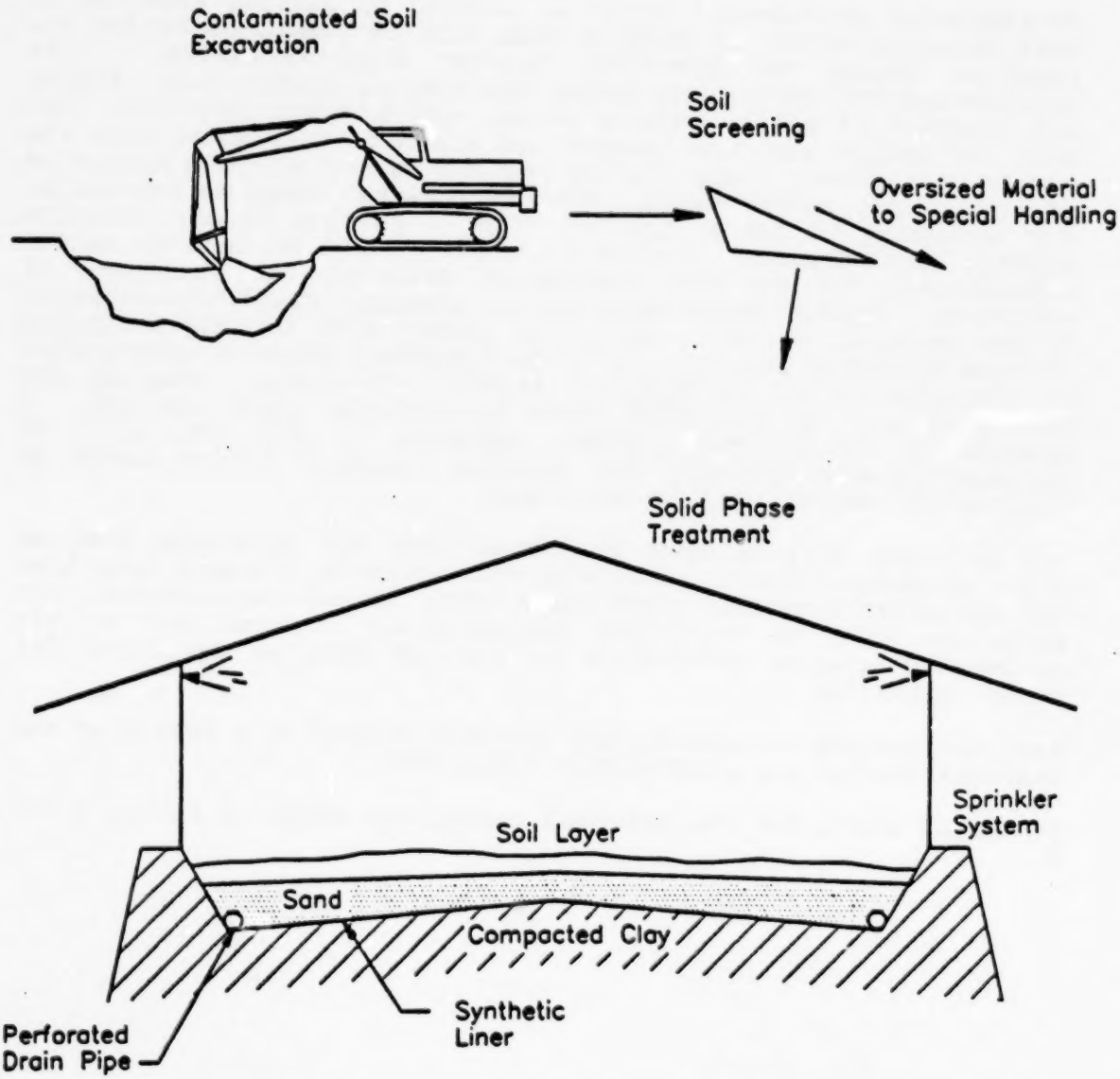
Bioremediation of soils will involve a fully contained surface impoundment system complying with minimum technology standards using conventional soil management practices (e.g., nutrient addition and soil aeration) to enhance microbial degradation and volatilization of organic contaminants. The system will be designed to contain and treat soil leachate and volatilized contaminants.

A system consists of a double lined treatment bed, a sand/gravel layer to serve as a leachate collection system with perforated drainage pipe and a sump, and groundwater monitoring. If volatile contaminants must be contained, the entire treatment bed will be covered by a modified plastic film greenhouse. An overhead spray irrigation system will be installed to control moisture and used as a means of distributing nutrients (see Figure 9).

The leachate will be recycled back to the treatment area via the spray irrigation system. Leachate in excess of acceptable limits will be treated on-site or collected for off-site treatment. Vapors will be treated (i.e. carbon adsorption) and released. The spent carbon would be regenerated if possible, or sent to an approved landfill facility. Approximately one-acre of land will be needed for treatment of 3000 cubic yards of soil.

High concentrations of heavy metals may prohibit use of this process. Additional soil sampling and testing and a treatability study are necessary prior to implementation. If small quantities of soils are identified as containing high levels of heavy metals which are incompatible with bioremediation, these soils will be isolated and treated on-site using a stabilization process (e.g. lime, Portland cement or bentonite). Treated soil will be redeposited in the excavation and covered with clean soil.

If high concentrations of heavy metals pose excessive restrictions on the use of bioremediation, thermal treatment of soils would be implemented in its place; in which case, ancillary activities would remain the same and the soil would then be treated using low temperature thermal treatment to drive off the volatile organic compounds. The organic compounds in the off-gas would be destroyed using an afterburner if ARARs for air emissions cannot be met. The mobile low temperature thermal treatment system developed by WESTON is designed to handle 15,000 lb/hr of contaminated soil based on



Source: Evoca Corp.
(revised)

SOLID PHASE BIODEGRADATION

FIGURE 9

20% soil moisture and 1% (10,000 ppm) VOCs. The system is comprised of three trailers that are a total of 120 feet long and 8 feet wide. The total height of the trailers, with the equipment assembled, is under 13.5 feet. As with bioremediation, thermal treatment will not remove metals and residual soil will be stabilized, if necessary, prior to redeposition.

Contaminated groundwater would be removed by pumping from one or more recovery wells. A pumping test will be conducted during the remedial design to determine aquifer characteristics. This information will be used to design the pumping system; i.e., number and location of wells, pumping rates, and gradient controls. The well (or wells) would be located and sized to draw water from the entire contaminant plume thereby preventing any off-site migration of groundwater contaminants. The pumped water would be treated by air stripping to remove greater than 95 percent of the volatile organic contaminants. Carbon adsorption would be used to remove contaminants in the air discharged from an air stripper, if necessary. Treated water from the air stripper would be discharged to the adjacent stream. Activated carbon used for air stripping off-gas and water polishing prior to discharge would be regenerated or disposed of in an approved landfill facility. Pumping and treatment will be continued until groundwater ARARs are met. A groundwater monitoring program, approved by the DNR, will be implemented and criteria for ceasing remedial action based on monitoring results will be developed.

Air modeling will be done to ensure that air emissions pose no acute or chronic health risks with risks from carcinogens less than 10^{-6} and 1/100 threshold limit value (TLV) for non-carcinogens. Air emissions will be evaluated during pilot studies and an air monitoring program acceptable to the DNR will be developed for normal operation.

Some changes may be made to the selected remedy as a result of the remedial design and construction processes.

Estimated costs for the selected remedy are shown in Tables 4 and 5.

TABLE 4

ESTIMATED COST OF SOIL REMEDIATION

Direct Cost Items		Basis	Cost*
1.	Removal of clean soil & staging	$4/cy x 9,000 cy	$ 36,000
2.	Excavation of solid waste, staging and disposal	$150/cy x 3,200 cy	480,000
3.	Free product removal, transportation and incineration	$0.50/gal x 5,000 gal	2,500
4.	Air monitoring		2,000
5.	Excavation & staging of contaminated soil	$5/cy x 3,000 cy	15,000
6.	Sampling & analysis of staged soil		20,000
7.	Land & site development		10,000
8.	Construction of staging areas & physical facilities for bioremediation		99,000
	(Thermal Treatment)		(40,000)
9.	Biological Treatment including leachate disposal)	$33/cy x 3,000 cy	100,000
	(Thermal Treatment)	($265/cy x 3,000 cy)	(795,000)
10.	On-site stabilization	$60/cy x 3,000 cy	180,000
11.	Backfill	$4.5/cy x 3,200 cy	14,400
12.	Clay Cap	$15/cy x 6,450 cy	96,750
13.	Revegetation	$1,250/ac x 2 ac	2,500
		TOTAL DIRECT	$1,058,150
			($1,694,150)

Indirect Cost Items		
1.	Engineering, design and treatability study	$150,000(100,000)
2.	Contingency	$160,000(250,000)
	TOTAL INDIRECT	$310,000(350,000)
	TOTAL CAPITAL COST	$1,368,150(2,045,000)
O&M Cost Items	$1,000/year for 30 years	
	TOTAL PRESENT WORTH COST	$1,385,000(2,060,000)
	Discount Rate =	5.00%

*NOTE: Cost for Thermal treatment same as bioremediation except as shown in parentheses.

TABLE 5
ESTIMATED COST OF GROUNDWATER REMEDIATION

Direct Cost Items		Cost
1.	Construction of recovery wells	$ 40,000
2.	Installation of pumps	10,000
3.	Construction of air stripper	110,000
4.	Activated carbon disposal (air treatment)	3,000
5.	Air monitoring	2,000
6.	Monitoring well installation	$ 20,000
	TOTAL DIRECT	$ 185,000

Indirect Cost Items		
1.	Engineering and Design (incl. treatability study)	$ 80,000
2.	Aquifer pump test	25,000
3.	Contingency	30,000
	TOTAL INDIRECT	$ 135,000
	TOTAL CAPITAL COST	$ 320,000

O&M Cost Items		
1.	Power, operation and maintenance	$50,000/year for 3 years
2.	Groundwater monitoring	$ 1,200/year for 3 years
3.	Lab analyses	$ 2,400/year for 3 years

TOTAL PRESENT WORTH COST $ 466,000
Discount Rate = 5.00%

The combination of Alternative S-3 for soils and GW-1 for groundwater, would provide a substantial risk reduction through treatment of contaminated soils and removal and air stripping of contaminated groundwater. The selected remedy ranks high with respect to the nine evaluation criteria except for implementability of the soil remediation. If implementability of on-site bioremediation of soils proves impractical, then Alternative S-2 (on-site thermal treatment) will be utilized as the method for soils remediation. Alternatives S-2 and S-3 are similar with regard to the evaluation criteria except for costs and implementability.

Since no immediate risk has been identified, the risks (i.e., time and development costs) of attempting to implement Alternative S-3 are justified. If Alternative S-3 proves impractical, Alternative S-2 will provide a well-proven technology as a substitute.

2.9 Statutory Determinations

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment:

The selected remedy protects human health and the environment by removing, destroying, and/or stabilizing all contaminants on the site resulting in residual levels below health-based standards. This will be accomplished through biodegradation of volatile organics in soil; stabilization of metals-contaminated soil, if necessary; covering the stabilized soil; and pumping and air stripping of groundwater-contaminated volatile organics; and carbon adsorption of the air stripper off-gas, if necessary.

The removal, treatment, and stabilization of contaminated soils will eliminate the source of groundwater contaminants. Removal of contaminated groundwater will result in residual contaminant levels below health-based standards. Currently there is no exposure to

groundwater contaminants above health-based standards. However, the contaminant plume contains carcinogens at a level which would present a 1.7×10^{-4} cancer risk if consumed on a regular basis and non-carcinogens above lifetime health advisory levels. Remedial actions will result in residual groundwater contaminants posing a cancer rate of 10^{-6} or less (within acceptable exposure, level of between 10^{-4} and 10^{-6}) and non-carcinogens below lifetime health advisory levels. There are no short-term threats or cross-media impacts that cannot be readily controlled.

Compliance with Applicable or Relevant and Appropriate Requirements:

The selected remedy of excavation, on-site bioremediation, stabilization, groundwater extraction and air-stripping will comply with all applicable or relevant and appropriate chemical- and action-specific requirements (ARARs). No location-specific ARARs have been identified. Tables 6 through 8 summarize all ARARs.

TABLE 6

ARARs FOR SOIL REMEDIATION

ARAR	COMPLIANCE
ACTION SPECIFIC	
Excavation from uncontrolled waste disposal trenches and subsequent placement of soil after treatment (40 CFR Parts 264 & 268)	Compliance
Waste pile storage of hazardous materials (not soil) to be decontaminated and non-hazardous materials (40 CFR Part 264, Subpart L)	Compliance
Tank storage of liquid free product recovered from waste disposal area (40 CFR Part 264, Subpart J)	Compliance
DOT Hazardous Material Regulations (49 CFR, Subpart C)	Off-site transport to comply with applicable Sections: 171, 172, 173, 177 and 178
IAC 567	Compliance with Chapters 140 & 141
Bioremediation treatment of soil (40 CFR 264, Subpart M)	Compliance with applicable sections
Treatment of soil by stabilization CFR 264, Subpart M) if metal concentrations are too high	Compliance with applicable (40 sections
Thermal treatment of soil (40 CFR 265, Subpart P) if bioremediation cannot be implemented	Compliance with applicable sections
OSHA 29 CFR 1910 (Health and Safety considerations for workers at site during remediation)	Compliance
CHEMICAL SPECIFIC (see Table 8)	
Placement of treated and/or excavated soils	Acceptable EP Toxicity and TCLP and Total Organic Hydrocarbons below 100 mg/kg achieved
Air emissions from excavating and treatment (Clean Air Act) (Risk from exposure to carcinogens less than 10^{-6} and 1/100 for non-carcinogens)	Compliance with applicable sections of State and Federal Clean Air Act and 10^{-6} risk for TLV carcinogens and 1/100 TLV for non-carcinogens

TABLE 7

ARARS FOR GROUNDWATER REMEDIATION

ARARS	COMPLIANCE
CHEMICAL SPECIFIC (see Table 8)	
IGAL for all contaminants	Remediation of groundwater to IGAL can be achieved
SDWA MCLs for arsenic, cadmium, chromium, lead, and benzene	Remediation of groundwater to MCLs can be achieved
SDWA Proposed MCLs an MCLGs ethyl-benzene, toluene, xylenes	Remediation of groundwater to MCLs/MCLGs can be achieved
Drinking water health advisory standard for MEK	Remediation of groundwater to MEK standard can be achieved
Treatment of groundwater by air stripping (Clean Air Act) (Risk from exposure to carcinogens less than 10-6, and 1/100 TLV for non-carcinogens)	Compliance with applicable sections of State and Federal Clean Air Act 10-6 risk for carcinogens, and 1/100 TLV for non-carcinogens
Discharge of treated groundwater to receiving stream (Clean water Act; substantive requirements of NPDES program including existing and proposed Iowa Water Quality Standards (Table 8)	Compliance with applicable sections of State and Federal Clean Water Act
ACTION SPECIFIC	
OSHA 29 CFR 1910 (Health and safety considerations for workers at site during remediation)	Compliance

TABLE 8

SUMMARY OF CHEMICAL SPECIFIC ARARs

Category	Compound	Maximum Concentration	Limiting authority
Air Emmissions	Carcinogens(Benzene)	10^{-6} cancer risk	CAA
	Non-Carcinogens	0.01TLV	CAA
Groundwater	Arsenic	0.05 mg/l	IGAL
	Cadmium	0.005 mg/l	Proposed MCL/MCLG (SDWA)
	Chromium	0.10 mg/l	IGAL & proposed MCL/MCLG (SDWA)
	Lead	0.005 mg/l	Proposed MCL (SDWA)
	Benzene	0.001 mg/l	IGAL
	Ethylbenzene	0.7 mg/l	IGAL & Proposed MCL/MCLG (SDWA)
	Methyl Ethyl Ketone	0.17 mg/l	IGAL
	Toluene	2.0 mg/l	IGAL & Proposed MCL/MCLG (SDWA)
	Xylenes	10.0 mg/l	IGAL & Proposed MCL/MCLG (SDWA)
	1,2-Dichloropropane	0.0006 mg/l	IGAL
	Methylene Chloride	0.050 mg/l	IGAL
Surface Water Discharge	Arsenic	0.2 mg/l	Proposed Chronic IWQC
	Cadmium	0.015 mg/l	Proposed Chronic IWQC
	Chromium	0.04 mg/l	Proposed Chronic IWQC
	Lead	0.03 mg/l	Proposed Chronic IWQC
	Benzene	5.3 mg/l*	CWA (freshwater acute)
	Ethyl Benzene	32 mg/l*	CWA (freshwater acute
	Toluene	2.5 mg/l*	Proposed acute IWQC
	Methyl Ethyl Ketone	*	CWA
	Xylenes	*	CWA
Soils Placement	Metals	Acceptable EP Toxicity	40 CFR 261.24
	Organics	Acceptable TCLP Test	40 CFR 268.41
		100 mg/kg Total Organic Hydrocarbons	

KEY:
CAA - Clean Air Act/Iowa Proposed Air Toxic Rules
IGAL - Iowa Groundwater Action Levels
SDWA - Safe Drinking Water Act
IWQC - Iowa Water Quality Criteria
CWA - Clean Water Act
MCL - Maximum Contaminant Level
MCLG - Maximum Contaminant Level Goal
TLV - Threshold Limit Values

*Treatment-based standard (i.e., 95% minimum removal likely to control)

Cost Effectiveness:

The selected remedy is cost-effective because it is the least expensive active alterative and yet provides a high degree of overall protection. It also provides certainty of effectiveness in the long-term due to a significant reduction in the volume of volatile organic contaminants through treatment of soils and air-stripping of groundwater, and a significant reduction in mobility of metals in soil through stabilization, if needed. The more expensive alternatives provide no significant advantages.

Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable:

The Iowa DNR and EPA have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be practically utilized in a cost-effective manner for the final response actions at the VPW site. Of those alternatives that are protective of human health and the environment and comply with ARARs, the State and EPA have determined that this selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence; reduction in toxicity, mobility, or volume achieved through treatment; short-term effectiveness; implementability; cost; consideration of the statutory preference for treatment as a principal element; and State and community acceptance. All of the active soil alternatives ranked similarly with respect to these primary balancing criteria except for cost and implementability. Cost is the deciding factor for choosing bioremediation of soils as the selected alternative. The selected soil alternative does rank lower with respect to implementability. If implementability on soil bioremediation proves impractical, the thermal treatment of soil will be implemented in its place. The thermal treatment alternative ranks high in implementability and ranks similarly to soil bioremediation with respect to the other criteria except cost. The selected groundwater remedy ranks highest with respect to all criteria for the active alternatives, including cost. The selected soil and groundwater remedies are the same as presented in the Proposed Plan which met no objection from the public.

Bioremediation of soils is an alternative treatment technology. Since bioremediation is not as proven as other technologies, its implementability is somewhat in question. If treatability studies and additional waste characterization indicate that bioremediation of soils is not effective, the more proven thermal treatment technology will be implemented in its place.

In-situ bioremediation of groundwater is an alterative treatment technology which was not selected over the conventional pump and air-strip technology because of its uncertainty in effectiveness and implementability in addition to its higher cost.

Preference for Treatment as a Principal Element:

By treating soils contaminated with volatile organics with bioremediation and stabilizing any residual metal-contaminated soil, the selected remedy addresses one of the principal threats posed by the site through the use of a treatment technology. The threat of groundwater contamination will be treated by removal of the source through treatment of soils and by withdrawal and treatment of contaminated groundwater. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

2.10 Documentation of Significant Changes

The Proposed Plan for the VPW site was released for public comment in August 1989. The Proposed Plan identified Alternative S-3, excavation and on-site bioremediation of soils, and Alternative GW-1, pumping and air stripping of groundwater, as the preferred alternatives. The Iowa DNR reviewed all comments received during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary.

RESPONSIVENESS SUMMARY FOR THE RECORD OF DECISION

The Remedial Investigation and Feasibility Study Reports and the Proposed Plan for the Vogel site were released to the public for comment on August 10, 1989. These two documents were made available to the public in both the administrative record and an information repository maintained at DNR Records Center, 5th Floor, Wallace Building, 900 East Grand,Des Moines, Iowa, and in the Orange City Public Library.

The notice of availability for these two documents was published in the Sioux City Journal on August 10, 1989. A public comment period on the documents was held from August 10, 1989 to August 31, 1989. In addition, after publication of notice a public meeting was held on August 21, 1989, at the Northwestern State Bank, Orange City, Iowa. At this meeting, representatives from DNR, EPA, and Vogel Paint and Wax Company answered questions about problems at the site and the remedial alternatives under consideration.

No written comments were received. Several oral comments were received at the public meeting as discussed below.

1. Comment: Has the installation of any new well be denied because of groundwater contamination from the Vogel site?

   Response: No.

2. Comment: Is Superfund money going to be used for this cleanup?

   Response: Under a consent order with DNR, Vogel Paint and Wax Company has paid for the costs to date and we anticipate they will also fund the cleanup work. If for any reason the company is not able to, or refuses to continue to do so, Superfund monies would be available to implement the proposed cleanup work.

3. Comment: What quantity of groundwater will be pumped and treated? Will this cause lowering of the groundwater thereby contaminating more soil and increasing the volume of soil to be treated; as related to floating hydrocarbons, in particular?

   Response: Floating hydrocarbons have been significantly decreased since removal of floating hydrocarbons was begun. In fact, a significant floating hydrocarbon layer was not detected during the latest sampling in July. In addition, the floating hydrocarbon layer has been detected in a sand and gravel formation which is confined above by a clay layer. This sand and gravel formation is under artesian pressure and as such pumping will reduce pressure without actually

dewatering the aquifer to a point, and it is not expected that this formation will be dewatered. Therefore, the expressed concern should not be a significant problem. In the remedial design an aquifer pumping test will be conducted for use in determining the size and location of recovery wells.

4. Comment: What is the plan for disposal of drums, pallets, and things like this?

   Response: The intention is to make a basic classification of hazardous and non-hazardous material. Non-hazardous material will be taken to a licensed sanitary landfill. Hazardous material will be taken to a landfill which is licensed for taking that type of hazardous waste.

5. Comment: Will any kind of special trucks or hauling equipment be necessary to transport this hazardous waste on public highways?

   Response: Yes, the hazardous waste would be regulated under the Resource Conservation and Recovery Act which includes regulations for the transportation, storage, treatment and disposal of hazardous waste. Also, Department of Transportation and Department of Labor (OSHA) regulations must be met. Some liquid waste may be taken to the Vogel plant for recycling.

6. Comment: Would the spent carbon from carbon adsorption used in the air stripping be treated as a hazardous waste also?

   Response: Yes.

7. Comment: What is the time frame for the proposed action?

   Response: The intent is to begin remediation in the Spring of 1990, with completion in 3-5 years for groundwater.

8. Comment: Have all the alternatives been proven to work?

   Response: Yes, all have been tried and proven. The bioremediation of soil and groundwater are less proven than other alternatives. The type of chemicals at the site are conducive for soil bioremediation. However, if it does not work, the more proven thermal treatment technology will be implemented. The groundwater pump and air stripping technology is very well proven.

9. Comment: If the bioremediation of soil doesn't work how long will it take to implement another technology?

Response: It is possible that cleanup could still begin as early as next spring. The overall schedule would not be significantly modified, if another technology for soil treatment is implemented.

10. Comment: When the proposed remedial efforts are completed will there be continued monitoring and further cleanup, if necessary?

Response: There are two levels of monitoring. At a minimum, groundwater samples will be collected and analyzed and then that data evaluated every five years. Also, more frequent monitoring may be required on a site-specific basis. Additional remedial action will be taken, if necessary.

SUMMARY

No comments were received which expressed dissatisfaction with the proposed alternatives. The lack of comments in general implies acceptance by the community. Therefore, no changes to the Proposed Plan have been made based on community acceptance.